C-A OPERATIONS PROCEDURES MANUAL

16.4.5 Requirements for the FES Maintenance and Safety Check-Off List for Apparatus Employing Hazardous Gas (Blue Sheet)

(Collider Accelerator Support Group Procedure A.5.0)

Note: This document was formerly a C-A Group Procedure. The content of the group procedure was reviewed by the Technical Supervisor. All approvals and/or issue dates of the original group procedure are maintained for present use.

Hand Processed Changes

HPC No.	Date	Page Nos.	Initials

Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman Date

F. Kobasiuk

Collider Accelerator Support Group
Procedure A.5.0
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Revision 00

DATE: August 10, 2004
ISSUED BY: F. Kobasiuk
SUBJECT: Requirements for the FES Maintenance and Safety Check-off List for Apparatus Employing Hazardous Gas (Blue Sheet)

1. Purpose

1.1 To provide guidelines for controlling the safe operation of hazardous gas devices and systems.

1.2 To provide guidelines for the maintenance of the gas detection, monitor and emergency systems associated with these hazardous gas devices.

2. Responsibilities

2.1 The liaison engineer (LE) for the respective experiment is responsible for requesting the maintenance of required systems and granting approval to fill.

2.1.1 The frequency of maintenance is based upon the operating schedule or a request for selective system testing.

2.2 The Beam and Experimental Service Group (BESG) Supervisor is responsible for completing Part A of the check-off.

2.3 The Collider Accelerator Support (CAS) Coordinator is responsible for completing Part B of the checkoff

2.4 The CAS Coordinator is responsible for completing Part C of the check-off

2.5 The BESG Supervisor is responsible for completing Part D of the check-off.

3. Prerequisites

None

4. Precautions

4.1 A new check-off shall be issued each time that a hazardous gas device is initially filled or following the completion of Part C of an existing check-off

5. Procedure

5.1 PART A (Maintenance and LE approval)

5.1.1 The BESG Supervisor completes Part A of the check-off

5.1.2 The LE reviews Part A for completion and signs for approval to fill the device.

5.2 PART B (Permission to Fill System)

5.2.1 The CAS Coordinator reviews Part A and completes Part B of the check-off

5.3 PART C (Dumping the System)

5.3.1 The respective hazardous gas system operator notifies the CAS Coordinator that he is starting to "Dump" the system of hazardous gas.

5.3.2 The CAS Coordinator informs the LE and completes Part C of the check-off

5.4 PART D (Lock-out of Monitoring Equipment)

5.4.1 The CAS Coordinator implements Part D of the check-off

5.4.2 The BESG Supervisor completes Part D of the check-off

6. Documentation

6.1 The issued check-off form.

7. References

None

8. Attachments

8.1 A typical FES Maintenance and Safety Check-off List for Apparatus Employing Hazardous Gas (STAR Experiment).
8.2 Procedural Notes for the check-off list.

"STAR"

Maintenance and Safety Check-Off List for Apparatus Employing Hazardous Gas

Hazardous Gas Type: _____ Location / Column: _____

Experimenter: _____ Number: _____ Liaison: _____

PART-A

Maintenance Conditions to be Satisfied Prior to Operation

Complete Checked Items

	Note	Items	Date	By
Building Gas Detector System Operational (Pass)	1			
Building Emergency Vent Fan Operational (pass)	2			
Building HSSD & Rack Smoke Detection Operational	3			
Experiment Gas Detector System Operational	4			
Sprinkler System Operational	5			
Experiment HSSD Operational.	6			
FM 100 System Operational	7			
Magnet Voltage Comparison & Lock Out Operational	8			
Substation Ground Monitor Operational	9			
Water Leak Detection System Operational	10			
Magnet Crash Operational	11			
Experimenters Power Crash Operational	12			
Warning Signs (No Smoking)	13			
Fire Extinguishers (2 minimum)	14			
Portable Gas Detector at CAS	15			
Exit Paths Cleared	16			
Safety Review Completed	17			
All Extraneous Material Removed	18			
Hold Point Fully Operational	19			
Action Sheet Posted	20			
Set All By-Pass Settings To Normal Status	21			

ABOVE ITEMS COMPLETED: DATE: _____ TIME: _____ BY: _____

BESG Supervisor

SPECIAL INSTRUCTION / COMMENTS / NOTES:

1. As per fire captain C. La Salla, all fire detection & sprinkler systems for 1006 IR are operational (1-17-2005). Ralph Brown & the Fire Alarm Technicians tested the independent smoke detection systems located in the following racks APMD, FPD, and EEMC. As per. R.Brown the systems are working as they should.

2. See attached e-mail for status of subsystems trips.

PART-B

STAR Operational Check-Off for Filling a Hazardous Gas System

Complete Checked Items

Hazardous Gas Type: _____ Location / Column: _____

Experimenter: _____ Number: _____ Liaison: _____

Approval To Fill Device Date: _____ Time:_____ By: _____

DEVICE PURGED BEFORE FILL:

Date: _____ Time: _____ By: _____
Hazardous Gas Operator

PERMISSION TO FILL:

Date: _____ Time: _____ By: _____
Watch Supervisor

PART-C

STAR Operational Check-Off For Dumping a Hazardous Gas System

DUMP STARTED:

Date: _____ Time: _____ By: _____
Watch Supervisor

REASON: _____

Conditions to be Satisfied before Dump is Completed
Complete Checked Items

	Note	Items	Date	By
Device Purged and Cleared of Hazardous Gas	1			
Vent System Purged and Cleared of Hazardous Gas	2			
Bleed Off Any Pressure Lines	3			
Hazardous Gas or Liquid Removed	4			
Coordinator Notified (Area Cleared of Gas)	5			

DUMP COMPLETED: Date: _____ Time: _____ By: _____
Watch Supervisor

PART-D

STAR Operational Check-Off For Dumping a Hazardous Gas System

Completed Checked Items

	Note	Items	Date	By
Warning Signs Turned Off (No Smoking)	1			
All Monitoring Equipment is Locked-Out	3			

ABOVE ITEMS COMPLETED:

Date: _____ Time: _____ By: _____
Watch Supervisor

PART-A

1. BUILDING GAS DETECTION SYSTEM:
   A. Have Security / Pass personnel verify that system is operational. And sign off this step. A high gas alarm should:
      1. Alarm Main Control Room.
      2. Turn on exhaust fans.
      3. Alarm in I.R.

2. BUILDING EMERGENCY VENT FAN:
   A. Beam Service Technicians will operate exhaust fan crash buttons, and verify that the fan crash system is working. There is a delay in fan start after pressing start button.

3. BUILDING HSSD & RACK SMOKE DETECTION:
   A. Contact the Fire Department and verify that the system is operational.
   B. Trip smoke detectors in four racks (East & West FPD, EEMC & PMD) located on the IR floor the trips are not monitored by SGIS. The trips are local AC trips to each independent rack.

4. STAR GAS DETECTION SYSTEM:
   A. Calibration of the Datamax 8000 Gas Detector will be done by a B.S.G. Technician. Refer to B.S.G. files "Calibrating Datamax 8000", or the Datamax operational manual located in the Star control room.
   B. Perform a test trip so that the Datamax will trip with a malfunction alarm. Check for the following response. Star Control Rooms get a malfunction alarm. PLC panel view is alarmed. After the alarm is cleared the alarm can be cleared on the panel view.
   C. Perform a test trip so that the Datamax will trip with a low gas alarm. Check for the following response. Main Control and Star Control Rooms get a low gas alarm. PLC panel view is alarmed. After the alarm is cleared the alarm can be cleared on the panel view.
   D. Perform a test trip so that the Datamax will trip with a high gas alarm. Check for the following response:
      1. Star Control Room & M.C.R gets a high gas alarm.
      2. Star magnet ramps down.
      3. Breakers All and A12 trip off.
      4. PMD power off. (Verify by seeing PMD contactor goes off, contactor is located in star labyrinth.)
      5. Start personnel need to verify that the following trips occur with a high gas alarm. Trips are the following; OFC H. V. trip, IFC Voltage trip, EMC trip & TPC voltage trip & tripped to purge. This can be simulated, but needs verification by the Star personnel.
      6. PLC panel view is alarmed. After the alarm is cleared the alarm can be cleared on the panel view.

E. Check with Star Personnel that the Pioneer gas detector has been calibrated for the TPC gas racks & verify these automatic functions. See last page in hand out for diagram.
   1. HV off
   2. LV off
   3. Argon purge

5. SPRINKLER SYSTEM:
   A Contact the Fire Department and verify that the system is operational. The ceiling heat detector does not have to be operational.

6. STAR HSSD SYSTEM:
   A Perform a test trip so that the HSSD will trip with a low-level smoke alarm. Check for the following response. The Star Control Room gets a low-level smoke alarm on the PLC panel view. After the alarm is cleared the alarm can be cleared on the panel view.

NOTE: This can be done in conjunction with the Fire Department, *or* verify that their system is operational & open the input to the PLC (SGIS).

   B. Perform a test trip, so that the HSSD will trip with a high-level smoke alarm. Check for the following response:
      1. Star Control Room, MC.R and the Fire Department get a high smoke alarm.
      2. Star magnet ramps down.
      3. Breakers All and A12 trip off.
      4. PMD power off. (Verify by seeing PMD contactor goes off, contactor is located in star labyrinth,)
      5. Start personnel need to verify that the following trips occur with a high gas alarm. Trips are the following; OFC H.V. trip, IFC Voltage trip, EMC trip & TPC voltage trip & tripped to purge (10 min. delay). This can be simulated, but needs verification by the Start personnel.
      6. PLC panel view is alarmed. After the alarm is cleared the alarm can be cleared on the panel view.

   C. Simulate low-level smoke, check for alarm & malfunction @ the PLC (SGIS).

7. STAR FM100 SYSTEM:
   For Star Platform rack row lA only. Verify the Star FM100 system & pull box is operational the fire department will have to be contacted to obtain that information & to complete the test.
   A Simulate high smoke & heat alarms & insure alarms are received in Star Control Room, M.CR & the Fire Department. Check that AC. breakers to rack row 1A trips off.
   B. Operate pull box (this can be simulate) & insure alarms are received in Star Control Room, M.C.R. & the Fire Department. Check that AC. breakers to rack row 1A trips off.

8. MAGNET VOLTAGE COMPARISON & MAGNETIC LOCKOUT:

A C.A.S. is to determine that the Power Supplies slow ramp with a trip. And the magnet voltage comparison = IKw sensitivity. This requires voltage difference measurements sensitive to +/- .1 volt. Note: If this can not be done at time of test the Star Power Supply must be locked out.

B. The key switch for this test is located in the STAR Control Room.

9. SUBSTATION GROUND MONITOR

A. Contact Line Crew to verify that the system is operational. Simulate ground fault trip @ input to PLC (SGIS). Check for alarm @ PLC (SGIS) & M.C.R.

10. LEAK DETECTION SYSTEM:

Notify Pump Room personnel before performing leak detector test. Due to the operation of main water valves and the change in water system pressure, test only the following platform leak detectors Det # 9 "West TPC, Det. #10 "East TPC, & Det. #12 "IFC/SVT.

A. Leak detector malfunction for each of the three detectors. Cause a malfunction by opening circuiting the detectors sensor wire. Check for the following response. 1. Alarm @ M C.R. & Star Control Room

B. Leak detector alarm for detectors #9 & #10, east & west TPC. Cause a water leak by applying water to sensor wire. Check for the following response.
   1. Alarm @ M.C.R. & Star Control Room.
   2. North supply and return water valves close.
   3. Ramp down magnet.
   4. Star personnel need to verify that the following trips occur with a TPC water leak alarm. Trips are the following; OFC H.V. trip, IFC Voltage trip, EMC trip.
   5. Star personnel need to verify that the following alarms are sent with a TPC water leak alarm. The alarms are as follows; Det. H2O leak to TPC & IFC systems.

C. Leak detector alarm for detector #12, IFC/SVT. Cause a water leak by applying water to sensor wire. Check for the following response.
   1. Alarm @ MC.R. & Star Control Room.
   2. Ramp down magnet.
   3. Star personnel need to verify that the following trips occur with a TPC water leak alarm. Trips are the following; OFC H.V. trip, IFC Voltage trip, EMC trip.
   4. Star personnel need to verify that the following alarms are sent with an IFC/SVT water leak alarm. The alarms are as follows; Det. H2O leak to TPC & IFC systems.

NOTE: At completion of test all affected water valves need to be put back in there original position!

11. MAGNET CRASH:

A. Verify that each of the manual crash buttons work. They are located:
   1. At the Power Supply - 1 button.
   2. On the North Platform - 2 buttons.
   3. On the South Platform - 2 buttons.

12. EXPERIMENTER POWER CRASH:
Before performing the following test obtain permission from Star Personnel.
A Manually operate all & A12 AC. breakers & then reset. Check for alarm @M.C.R & PLC (SGIS).
B. Put all by pass keys to by-pass position, then test crash button located @ PLC rack in DAQ room. Check for the following response. NOTE: CRASH BUTTON CAN NOT BE BY-PASSED.
    1. Check for alarm @ M.C.R & PLC (SGIS).
    2. Trip All & A12 AC. breakers off.
    3. Trip PMD power
    4. Trip Power Supply to ramp down.

13. WARNING SIGNS (NO SMOKING):
A Insure that "No Smoking" signs has been placed in their proper positions and no closer than 20 feet from apparatus employing hazardous gases.

14. FIRE EXTINGUISHERS (2 MINIMUM):
A Insure that there are adequate fire extinguishers (minimum of two) located in the area of the hazardous gas device.

15. PORTABLE GAS DETECTOR AT CAS:
A Confirm that a Portable Explosive Atmosphere Detector is available to the C.AS. Watch.

16. EXIT PATHS CLEARED:
A Insure that all exit paths are cleared of all obstructions.

17. SAFETY REVIEW:
A Check with Liaison Engineer for status.

18. ALL EXTRANEOUS MATERIAL REMOVED:
A Remove all extraneous material from area, as per Liaison Engineer.

19. HOLD POINT FULLY OPERATIONAL (Star Control Room):
A Inspect & insure that all applicable monitoring equipment is operational in the Star Control Room.

20. ACTION SHEETS POSTED:
A Post a call in sheet at ECR, MCR & Star DAQ Room by PLC. Tony Krupien supplies call in sheet. Ensure action sheet is current for alarm response.

21. SET ALL BY-PASS SETTINGS TO NORMAL STATUS:
A Set by-pass key switches to normal positions remove all keys from switches and have C.AS. watch lock the by-pass keys in the lock box located @ PLC in DAQ room.

PART-B

Before completing Part-B the following must be satisfied.

A. Liaison Engineer is responsible for requesting the maintenance of required system and granting approval to fill.
B. Part A of the maintenance& safety Check-off must be completed and signed by the B.S.G. supervisor.
C. The Star control room staff, & M.C.R. must be notified that Hazardous Gas will be presented in the TPC.

PART-C

1. DEVICE PURGED AND CLEARED OF HAZARDOUS GAS:
   A. To ensure that device is purged and cleared of hazardous gas, check with Hazardous Gas Operator depending on type of device.

2. VENT SYSTEM PURGED AND CLEARED OF HAZARDOUS GAS:
   A. To ensure that vent system is purged and cleared of hazardous gas, check with Operator depending on Hazardous Gas type of device.

3. BLEED OFF ANY PRESSURE LINES:
   A. The, Hazardous Gas Operator shall ensure that all appropriate pressure lines have been bled off and shall initial item #3.

4. HAZARDOUS GAS OR LIQUID REMOVED:
   A. Check with Hazardous Gas Operator to ensure that all hazardous gas or liquid is removed from the building.

5. COORDINATOR NOTIFIED (AREA CLEARED OF GAS):
   A. Notify Star Control that area is cleared of hazardous gas.

PART-D

NOTE: Part C must be completed before initiating Part-D.

1. WARNING SIGNS TURNED OFF (NO SMOKING):
   A Check that all Warning and/or No Smoking signs are off.

2. ALL GAS MONITORING EQUIPMENT IS LOCKED OUT:
   A This item is to be completed by the Beam Service Group, but may be completed by the C.A.S. Watch.
   B. Inform the Star Control and C.A.S. Watch before turning off any monitoring equipment for a hazardous gas device, so that they can disregard any alarms.
   C. Before, the Local Gas Detector is shut down. Check with experimenter on status of his Experimental Power, it may be necessary to by pass system interlocks to stop the power from turning off.